

1. An Account of a Visit to the Birds'-nest Caves of British North Borneo. By H. PRYER, C.M.Z.S., &c.¹

[Received October 16, 1884.]

In March last I visited the island of Borneo, and during my stay at Elopura determined to ascertain if possible the substance from which the Swift makes the edible nest, so much prized by the Chinese.

¹ In illustration of this paper Mr. Pryer sent specimens of the Swift referred to, and of its nest and eggs, also of the alga on which the bird was supposed to feed, and of the Bat which inhabits the same cave.

The Secretary stated that the Swift had been determined by Mr. Sharpe to be *Collocalia fuciphaga*, and the Bat by Mr. Dobson to be *Nyctinomus plicatus*.

The Secretary also read the following letter and Report addressed to him upon this subject:—

British Museum (Natural History),
Cromwell Road, South Kensington, S.W.
29th October, 1884.

DEAR SIR,

The alga contained in the bottle you left with me is a species, probably new, of *Glæocapsa*. The individuals are of microscopic dimensions, and may be found in great numbers composing the dark-coloured layers on the surface exposed to the air; the lighter-coloured, somewhat gelatinous mass consists of the dead cells of the *Glæocapsa* gradually accumulated beneath the upper layers. It is only under the influence of reagents that the remains of structure are displayed in this mass and its true nature discovered.

Species of this genus are common on damp rocks and walls of caves, but I have never seen any occurring in such masses as this one. I may mention, however, as a remarkable coincidence that I have seen an allied species of *Glæocapsa* covering with a thick coating the walls (high above high-water mark) of a sea-cave a few miles to the north of Arbroath. This cave was inhabited by numerous pigeons, and I was in the habit of frequently climbing into it when a boy for the purpose of capturing the young pigeons in their nests in the roof. The *Glæocapsa* (as I subsequently determined it) impeded me in this operation, and to the best of my recollection it grew very abundantly on the old excrement of the birds. Whether the excrement formed a specially suitable *nidus* for the alga it would be interesting to discover in regard to the present case—in which at all events the alga seems to assist in forming a *nidus* for the bird! I have examined a portion of a nest sent me by Mr. Holmes, of the Pharmaceutical Society's Museum, without finding any trace of the alga in it.

I have retained a small portion of the alga for the purpose of further determination, and I hope to have the means of comparing it with the one I refer to above.

Yours &c.,

GEORGE MURRAY.

Report on the Edible Birds'-nest. By J. R. GREEN, B.A., Assistant Demonstrator in the Physiological Laboratory, Cambridge.

The specimen gave no evidence under the microscope of any distinct vegetable structures, and similarly gave no chemical evidence of either cellulose or any other distinctly vegetable product. All the reactions went to prove that the great mass of the substance was *mucin*, and such microscopic features as were apparent confirmed the view that the nest was formed of strings of mucus plastered together. The mucus when separated out gave some reactions, different to a certain extent

For this purpose I spent two days in the caves of Gomanton, a high limestone cliff situate twelve miles inland from the head of Sandakan Bay; and having been successful, I send herewith specimens of the bird, its nest, and eggs, and of the fungus said to be used in the construction of the nest.

Before starting for the caves, I inquired what it was generally thought the nests were made from, and was told that it was probably a gum or resin from some of the forest-trees, and that the statement, so often repeated in popular works on natural history, that the birds gather a seaweed for the purpose, was extremely improbable—the caves producing the largest quantity of nests being generally situated a considerable distance inland: besides that round Sandakan Bay there is a marked absence of seaweed, which does not grow in any quantity at the various points which I touched at.

On the 19th of March, at half-past 10 o'clock A.M., together with a gentleman in the employ of the British North-Borneo Company, I left the flourishing little town of Elopura, at the entrance of Sandakan Bay, for the Sapugaya River, which flows into this Bay about 8 miles below the town. Our party was composed of two Englishmen (W. and self), one Chinese cook, five Malays, eight Sulus, a Buludupi, and my Japanese collector, eighteen in all, representing six different languages, the conversation between these different specimens of *Homo sapiens* being carried on in Malay. Our mode of conveyance was a steam-launch, having in tow a large boat to which we were to transfer ourselves when the river grew too shallow to proceed further in the launch. We reached the mouth of the Sapugaya at noon. Flying about the Bay were a number of Frigate Birds and a few birds of prey. The river presented the usual features of all North-Bornean scenery: the land at the mouth and for several miles each side was covered with a Mangrove swamp; further up the Nipas replace the Mangroves, until, where the river-banks rise above the reach of the tide, the true forest extends down to the water's edge. Curlews, Kingfishers, and Sandpipers flew along ahead of us.

Making the launch fast to the landing-stage of a coffee and sugar plantation, we took to our rowing-boat, as beyond the plantation further navigation in the steam-launch is unsafe; after rowing for some hours our sleeping-place for the night was reached. This was a very primitive affair, being a long narrow shed thatched with altaps made from the Nipa leaf, and raised some six feet from the ground on posts, the floor being composed of unbarked sticks ten feet long; over this we spread a large india-rubber (without which no one should travel), and made ourselves as comfortable as possible under the circumstances. I had brought my mosquito-net, but did

from those which are given by ordinary mucin; but these differences were not great enough to weaken the conclusion that the nest is really composed of mucus secreted by the peculiar glands superficially described by Sir Everard Home, as present in the bird which builds the nest. It would be very interesting to obtain these birds in living condition, so that one might study the mechanism of the secretion of such a relatively enormous mass of material as well as examine the constituents of the secretion taken quite fresh.

not require it, as there are, very fortunately, no mosquitoes, and I was not annoyed with them at any time during my stay in Borneo.

Next morning at 7 o'clock A.M. I started for a five hours' walk through the forest: the track is a good one and fairly level: it follows a small stream, now dried up into a succession of small pools, swarming with small fish which are very tame, and would come up and nibble at one's fingers directly the hand was placed in the water. We were now passing out of the sandstone district, which is the formation about Elopura, rising there into high bluffs, under and upon the side of one of which the town is built. Occasional blocks of limestone showed themselves in the pools, and I began to find land-shells in abundance for the first time. Tracks of Elephants were common and very fresh, our approach having evidently just driven them off the path; an orang-utan, deer, monkeys, fire-back pheasants, crows, hornbills, &c., were seen, and the argus pheasants were calling in every direction. The forest was free from undergrowth, and one could walk in any direction unimpeded. The largest trees reach an enormous height, sending out their first branches two hundred feet from the ground, the trunks being supported by huge buttresses at the base of the trees.

At noon the path came abruptly to the foot of a high limestone cliff, which had hitherto been concealed by the forest-growth. This cliff is honeycombed with caves, most of which are connected in some way with a large one, known to the Malays by the name of Simud Itam, *i. e.* the Black Cavern. The entrance to this is at the foot of the cliff and is about 100 feet wide and 250 feet high; inside the height is greater, the roof being 360 feet from the ground; it is well lighted, as about 200 yards from the entrance there are two large circular openings in the roof. Here a number of the Swifts were flying about, and also numbers of Bats, the ground being covered with large quantities of guano. The birds'-nests could be seen attached to the sides and roof. From various corners and places, apparently inaccessible, could be seen the rattan ladders and stages used by the nest-gatherers. I have seen many caves in other parts of the world, but nothing to compare with this one, which strongly reminded me of a huge cathedral, but far surpasses in its grandeur any work of human hands.

From the mouth of the cave ran a small amount of water, strongly impregnated with guano, and on this many butterflies of the genera *Papilio* and *Pieris* settled; a very pretty *Cyrestis* was flying in and out: I secured several specimens, but missed a most lovely *Papilio*, quite new to me and which I believe to be undescribed. Tracks of Pigs led in all directions about the floor of the cave.

After a rest I ascended the cliff about 400 feet; the ascent is quite perpendicular: in many places ladders are erected and in others the water-worn surface of the limestone gives a foothold. On the ascent I noticed many Orchids, Begonias, ferns, and mosses I had not seen elsewhere. My collector caught a snake I believe to be an *Elaphis*, certainly the most beautiful Colubrine I have seen, white and light grey. The Malays said it was very destructive to the Swifts,

and also that it was poisonous; to convince them it was not, I allowed it to bite me. At this point I found myself at the mouth of a cave named Simud Putih, *i. e.* the White Cave; the entrance is about 40 feet high by 60 feet wide, and descends very steeply, widening out to a great size, and having a perpendicular unexplored abyss at its furthest point. This cave is used by the nest-gatherers as their dwelling-place, and at the entrance are their platforms of sticks, one of which was placed at my disposal by the head man: it is also the cave by which the great body of the Swifts enter. Immediately outside it is a great circular opening leading sheer down into Simud Itam: this is one of the two openings mentioned as giving light to that cave, and is the entrance most in use by the Bats. As soon as I had unpacked and settled down on my platform, I sallied out to find the material from which the birds make their nests, as my previous experience is that birds do not as a rule travel far for the bulk of the material they use. I was speedily successful in my search. It is a fungoid growth which incrusts the rock in damp places, and when fresh resembles half-melted gum tragacanth: outside it is brown but inside white, and little if any change in its consistency is effected by the bird; the inside of the nest is, however, formed by threads of the same substance, which are drawn out of the mouth in a similar way to that of a caterpillar weaving its cocoon.

The Malays told me to be sure and return to Simud Putih at 5 o'clock, as I should then see the most wonderful sight in all Borneo—the departure of the Bats and the return to roost of the Swifts. I accordingly took a seat on a block of limestone at the mouth of the cave; the surface of the coral of which it is composed is quite fresh looking, notwithstanding that it must have been many ages in its present position, several hundred feet above sea-level. Soon I heard a rushing sound, and, peering over the edge of the circular opening leading into Simud Itam, I saw columns of Bats wheeling round the sides in regular order. Shortly after 5 o'clock, although the sun had not yet set, the columns began to rise above the edge, still in a circular flight: they then rose, wheeling round a high tree growing on the opposite side, and every few minutes a large flight would break off and, after rising high in the air, disappear in the distance; each flight contained many thousands. I counted nineteen flocks go off in this way, and they continued to go off in a continual stream until it was too dark for me to see them any longer. Among them were three albinos, called by the Malays the Rajah, his son, and wife.

At a quarter to 6 the Swifts began to come in to Simud Putih: a few had been flying in and out all day long, but now they began to pour in, at first in tens and then in hundreds, until the sound of their wings was like a strong gale of wind whistling through the rigging of a ship. They continued flying in until after midnight, as I could still see them flashing by over my head when I went to sleep. As long as it remained light I found it impossible to catch any with my butterfly-net; but after dark it was only necessary to wave the net in the air to secure as many as I wanted. Nevertheless

they must undoubtedly possess wonderful powers of sight to fly about in the dark in the deepest recesses of their caves and to return to their nests, often built in places where no light ever penetrates.

Shortly before sundown a pair of Kites made their appearance, and, taking their station over the Bat-chasm, would every now and then clumsily swoop down into the thick of the Bats, generally securing a victim every time. I shot both these marauders, which proved to be *Haliaster indus*, a very beautiful but common bird. There were also several specimens of a Hawk working away on the Bats in a very business-like manner, and woe betide the unfortunate bat singled out from its flock and put in chase. The way these Hawks took the Bats one after the other was astonishing, and strongly reminded me of a man eating oysters. I shot several of these Hawks, but only secured one, the others being lost over the side of the cliff. It proved to be the rare *Machirhamphus alcinus*, remarkable for the size of its gape and its small beak, both of which very much resemble those of the Swift. Its habits in taking its prey are also similar, the Swift catching and swallowing its food while on the wing in the same way this Hawk does.

Arising before daylight, I witnessed a reversal of the proceedings of the previous night, the Swifts now going out of Simud Putih and the Bats going into Simud Itam. The latter literally "rained" into their chasm for two hours after daylight. On looking up, the air seemed filled with small specks, which flashed down perpendicularly with great rapidity and disappeared in the darkness below.

Several examples of *Machirhamphus alcinus* put in an appearance, hawking after the Swifts, which they had rarely attempted to take the night before, and generally then without success. Their plan now was to swoop down from behind into the stream of birds issuing from the mouth of Simud Putih, generally carrying off a bird each three times they attempted to do so.

I secured many specimens of the Bat, and found them to be all of one species; the caudal membrane extends only half down the tail, which is free for half an inch, giving the animal very much the appearance of a mouse when the wings are folded. The wings are very long and narrow, and it is a very swift flyer. I noticed a few specimens of a Swallow resembling *Hirundo rustica*, and also some very large Bats at the mouth of the cave.

After breakfast I started for the summit of the cliff; the path, which is barely two feet wide, in many places overhangs the Bat-chasm, the bottom of which is lost in darkness 600 feet below. The summit at 900 feet is reached: here was a most lovely view:—to the east is a large plain, in the early morning covered with mist resembling a vast sheet of water; this is no doubt the origin of the mythical lake of Kina Balu, which only exists in the imagination of the map-makers. In every direction except the north extended miles upon miles of forest, broken here and there by mountain-tops. Unfortunately Kina Balu, the highest mountain in Malayasia, was hidden by clouds. To the north I could trace the whole of Sandakan Bay and the open sea beyond. I was much surprised to find

how short a distance in a direct line, only some 20 miles, I had actually come from Elopura : it had taken some $13\frac{1}{2}$ hours' continuous travelling by launch, boat, and walking to reach this point. On the highest part the Malays have built a house, into which I was invited, and inspected a quantity of very fine white nests, gathered from a small opening close by, which is however 116 fathoms deep, and is connected, as I afterwards found, with Simud Putih.

I then commenced to descend by another track, and found it much easier work than going up. About 200 feet below the summit a large opening is reached ; this looks exactly like a railway-tunnel. Lighting candles and attaching them to the lower part of the staves each of the party carried, the gloomy portal was entered, and daylight was soon lost sight of, the path becoming steeper and more slippery the further it descended. About 500 feet below the entrance it became unpleasantly warm and the atmosphere stifling, the guano giving out a most disagreeable smell. I was here shown a small beam of light from the small opening at the top of the rock, 696 feet above. The footing became here very precarious, single poles being laid on the surface of the soft guano, upon which I found considerable difficulty in balancing myself. The guano exists in enormous quantities in this cave ; a fifteen-feet pole, thrust down into it, does not touch the bottom. Just when matters were getting unbearable the cave turns to the right, and the path commences to ascend, and I was very glad to find Simud Putih had been reached : after a slippery climb I merged into daylight, very much dazzled. All the roof of the dark parts of the cave was occupied by the nests of the Swifts, the birds keeping up an intermittent twittering, sounding, from the immense quantity assembled, like surf breaking on a rocky shore.

In this cave I saw the nest-gatherers at work getting in their crop. A thin rattan ladder was fixed to the end of a long pole and wedged against the rock ; two men were on the ladder—one carried a long four-pronged spear, a lighted candle being fixed to it a few inches below the prongs. By the aid of this light a suitable nest is found and transfixed with the prongs ; a slight twist detaches the nest unbroken from the rock ; the spear is then withdrawn until the head is within reach of the second man, who takes the nest off the prongs and places it in a pouch carried at the waist. The nests of best quality are bound up into packets with strips of rattan, the inferior being simply threaded together ; the best packets generally weigh one catty ($1\frac{1}{3}$ lb.), averaging forty nests, and are sold at \$9 each—the annual value of the nests gathered being about \$25,000. These caves have been worked for seven generations without any diminution in the quantity : three crops are taken during the year, and unless a considerable number of black nests is gathered, the supply of white nests falls off. Accidents to the men employed very rarely occur, notwithstanding the dangerous nature of their occupation. There is also an almost inexhaustible supply of guano in these caves ; and the number of bats and birds in them is so enormous that if proper care is taken not to disturb them, a regular quantity may be taken out yearly without fear of exhausting the supply. These caves are

therefore a very valuable property to the British North-Borneo Company.

On the 22nd March, at 7 A.M., I left Simud Putih, and after a farewell visit to Simud Itam commenced the return journey. The Sapugaya River was reached before noon, but I was disappointed at finding our boat high and dry, the tide being out. As it had not returned at half-past 4 o'clock all hands were mustered to carry the boat down bodily to deep water; this was soon accomplished, although the boat was a very heavy one. Just at dusk we rowed up to the steam-launch; several of that very peculiar animal the Galeopithecus were floating from tree to tree on the plantation, and I noticed some very large Bats flying about. Getting up steam, we then proceeded very cautiously along between the high Nipas which lined the banks and rendered steering in the dark a difficult matter. At half-past 10 P.M. the pier at Elopura was reached.

2. On some Mammals from Somali-land.

By P. L. SCLATER, M.A., Ph.D., F.R.S.,
Secretary to the Society.

[Received November 12, 1884.]

(Plates XLIX. & L.)

Mr. C. Hagenbeck of Hamburg, the well-known dealer in living animals, has kindly sent to me some flat skins of Mammals, prepared by the natives of Somali-land, which he received along with a collection of living animals recently imported from Berberah.

As little is yet known of the Mammals of this interesting country, I have thought it worth while to lay these skins before the Meeting, and to offer a few remarks upon some of them which present points worthy of notice.

Our present authorities upon the Mammals of Somali-land are but few in number. Mr. Blyth's report on Captain Speke's collection¹, Henglin's essay on the Fauna of the Red Sea and Somali-coast², and Révoil's 'Faune et Flore des Pays-Somalis,'³ are the only ones that I can mention concerning the north of Somali-land; but Von der Decken's expedition penetrated into the south of the same country, and the reports on his collections should also be consulted.

In Captain Speke's list but three species of Antelopes are mentioned, one of which, called by Mr. Blyth *Gazella cuvieri* and subsequently *Gazella spekii*, may probably be the same as that of which a skin is now before you. In the zoological volume on the

¹ "Report on a Zoological Collection from the Somali Country," by E. Blyth: Journ. Asiatic Soc. Bengal, vol. xxiv. p. 291 (8vo, Calcutta, 1856).

² "Report on a Zoological Collection from the Somali Country," by Edward Blyth. Reprinted from the 24th vol. of the Journ. Asiatic Soc. Bengal; with Additions and Corrections by the Collector, John Hanning Speke (8vo, London, 1860).

³ 'Petermann's Mittheilungen,' 1861, p. 11.

³ Révoil, 'Faune et Flore des Pays-Somalis' (8vo, Paris, 1882).